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EDITORIAL

On these pages the editor offers his opinions, unshackled by advertising patrons and unrestrained by anything save a sense of the decent and the truthful. The editor, alone, is responsible for their type, their tone and their tenor.

re-SEARCH

IT IS a well-known fact that certain products and processes are established in the food, textile, oil and other industries long before they are given consideration for pharmaceutical, medical or cosmetic use. Take for instance the sulfonated oils and the more recent sulfated esters of the gardinol, aerosol and other types. Used for years in the textile industries, as detergent and penetrating agents, their application in the drug and cosmetic fields is but comparatively recent. As soap replacers in dental preparations (e. g., irium) and shampoos (e. g., drene) in creams, liniments, ointments, as spreaders in garden insecticides, and in divers other preparations they are now firmly established in use. But it took many years for them to find such application. And even today, largely because of a lack of study of their behavior toward living tissue, no use has been made of any of these products in internal medicines. They may have laxative action, they may be profound synergists, or they may be dangerously hemolytic. They should be valuable additions to compatible antiseptics, greatly increasing their spread and penetration. On the other hand, when we consider the diversity of these products and the complexity of the chemical structures of many of them it is easy to realize why their pharmacological action has not had much attention. But there is still a great challenge to real research in this uncharted field.

Then consider the new insecticides. There are dozens of useful organic structures recently studied. Then there is rotenone, and the vegetable extracts of pyrethrum, derris, cubé root and other such drugs. Is it not reasonable to believe that these substances have some medicinal uses? Is rotenone a bactericide or a parasiticide? May it not be valuable in an ointment in the treatment of certain skin afflictions?

A field greatly exploited and expanded in recent years is the fresh fruit and vegetable juice field. Much progress has been attained in the stabilization of these products.

Tomato, grapefruit and pineapple juices lead the field in this array of liquids. Yet prior to 1925 bottled and canned juices were limited to bottled grape juice and small amounts of bottled apple, loganberry and other berry juices.

Grapefruit juice came in in 1926, tomato juice was packed first on an important scale in 1928 and pineapple juice joined the procession in 1931.

The total quantity of fruit and vegetable juices preserved exceeded 32,000,000 cases in 1937. The volume is still growing and tomatoes alone provide approximately 13,500,000 cases annually.

Canned orange juice introduced in 1930 reached large commercial production in 1934. More recently lemon and cranberry juices have appeared, along with the "nectars" of apricots, peaches and pears. Plum, cherry, papaya, currant, tangerine and pomegranate juices are available. Sauerkraut juice is well known and small amounts of celery, spinach, carrot, garlic, onion, beet and lettuce juices are packed.

The new continuous flash-pasteurization processes are largely responsible for success in the flavor conservation of commercial fruit juices, although container material also plays an important part. But it was with relation to drugs that we were thinking of this particular development.

The methods used in the stabilization of commercial fruit juices should be studied by those persons interested in fresh plant juices for medicinal use. It is known, for instance, that the *fresh* juice of the impatiens plant is useful in the treatment of rhus poisoning, yet no way has been devised as yet whereby the curative virtues may be preserved.

Country people hereabouts insist that the fresh juice of equisetum (horsetail) is useful in the treatment of diabetes.

The fresh juice of the fairly succulent digitalis, of mullein, lettuce, tansy, aloe and many other medicinal plants may have properties quite unlike and perhaps more potent than the dried plant or its preparations.

There is a certain quality to fresh botanicals not possessed by the bone-dry and often antiquated drug.

No one can convince this writer that grandmother's fresh drug infusions or old-fashioned teas of garden herbs had no especial value. Too much neglected have been sage and chamomile, boneset and mullein, bitter apple and horse nettles, plaintain and heal all, liver-

wort and tansy—and a host of other freshly picked herbs and parts of herbs that have served the countryside for centuries with their healing ministrations.

And if a study of the modern methods of preparing stable, full flavored fruit and vegetable juices is undertaken, there is no reason for believing but that new light will be shed on the preservation and stabilization of drugs, especially botanical drugs.

IVOR GRIFFITH.

Some Observations on the Colloidal Impurities in Distilled Water. S. W. Pennycuick and C. E. Woolcock. *J. Phys. Chem. 43,* 681 (1939). Apart from the small amounts of electrolytes that are present in distilled water, there are also present small quantities of organic and inorganic colloid substances. For ordinary purposes the latter may be ignored and the specific conductivity taken as a measure of the degree of purity. Thus when the conductivity is less than 10-6 reciprocal ohms the water is referred to as conductivity water and it is considered sufficiently pure for most purposes, even the most exacting.

In some cases, however, this measure of purity is of little value. For instance, in the preparation of colloidal gold by reduction with formaldehyde traces of certain foreign substances in the water have the effect of preventing the formation of fine-grained stable sols. The action of these substances is unknown, but apparently they slow down the velocity of nuclei formation with the result that crystallization once it begins is so rapid that the gold particles become too large to remain in colloidal suspension.

The authors have made a careful investigation relative to the nature of this colloidal material in distilled water and means of preventing its harmful influence in the preparation of gold sols with the following results: The colloidal materials at least in part appear to be in the nature of positively charged hydrophobic particles. Their inhibitory effect can be reduced and sometimes completely removed by (a) allowing the water to stand undisturbed for some weeks; (b) freezing the water; (c) adding very small amounts of stannic chloride at pH between 9.7 and 10.3. L. F. T.

ORIGINAL ARTICLES

PRESERVATIVES FOR PREPARATIONS CONTAINING GELATIN

By Louis Gershenfeld, Ph. M., B. Sc., P. D.
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RECENTLY, gelatin was added to the list of emulsifying agents used in pharmaceutical preparations. As a result of an extensive study (1) a form of edible gelatin of the highest purity has been developed which has several advantages over acacia, tragacanth, agar, etc., when used as an emulsifier: 1, a good stabilizer, 2, economical due to low cost and small amount required, 3, readily digestible, 4, permits the preparation of a highly fluid emulsion.

Two types of this gelatin are marketed under the trade name of "Pharmagel": (1) Pharmagel A (acid type) which is derived from an acid treated precursor; and (2) Pharmagel B (basic type) which is derived from an alkali treated precursor. The former is a good emulsion stabilizer at an acid pH of 3.2, and the latter is efficient at an alkaline pH of 8 (2) (3) (4) (5).

The preparation and uses of gelatin as an emulsifier have been reported and described in detail by Tice (6). This report deals with a consideration of the preservation of gelatin solutions which are used in making such emulsions, inasmuch as the latter serve as excellent media for bacterial growth.

Bacteria, yeasts and moulds cause alterations to many products used in the food, drug and cosmetic industries, so that many of these products cannot be employed for the desired use. This is true of those preparations containing gelatin. It is on this account that the use of gelatin in pharmaceutical and medicinal preparation requires certain precautions.

Several methods may be employed to eliminate the contamination of such preparations. They can be classified as physical and chemical. The physical methods entail the use of heat and bacteriological filtration. The latter, however, cannot be used under all circumstances. Chemicals as preservatives are often the agents of choice wherever possible. An ideal chemical preservative or anti-

Experimental

The following preservatives (7) (8) (9) (10) (11) were used:

CHART 1

LIST OF PRESERVATIVES

For (A) Acid Type Gelatin				For (B) Basic Type Gelatin			
No.	Name	Concentration	Physical prop. in gelatin sol. after cooling	No.	Name	Concentration	Physical prop. in gelatin sol. after cooling
1.	Sodium benzoate	.1%	Strong gel., colorless, no pp't.	1.	Sodium benzoate	.1%	Strong gel., colorless, no pp't.
2.	Thymol	.1%	Med. gel., colorless, no pp't.	2.	Thymol	.1%	Strong gel., colorless, no pp't.
3.	Chlorothymol	.1%	Strong gel., turbid slight pp't.	3.	Chlorothymol	.1%	Strong gel., colorless, slight pp't.
4.	Chlorobutanol	.5%	Med. gel., colorless no pp't.	4.	Chlorobutanol	.5%	Strong gel., colorless, no pp't.
5.	Betanaphthol	.2%	Med. gel., colorless cryst. pp't.	5.	Betanaphthol	.2%	Strong gel., light orange color, pp't.
7.	Sodium salicylate	.1%	Strong gel., colorless no pp't.	7.	Sodium salicylate	.1%	Strong gel., colorless, no pp't.
8.	Phenol	.5%	Weak gel., colorless, no pp't.	8.	Phenol	.5%	Med. gel., colorless, no pp't.
9.	Cresol	.4%	Strong gel., colorless, no pp't.	9.	Cresol	.4%	Strong gel., colorless, no pp't.
11.	Parachlormetaxylenol	.1%	Med. gel., colorless, slight pp't.	11.	Parachlormetaxylenol	.1%	Strong gel., colorless, pp't.
12.	Parachlormetacresol	.25%	Med. gel., colorless, no pp't.	12.	Parachlormetacresol	.25%	Strong gel., colorless, no pp't.
13.	Oxyquinoline sulfate	.1%	Med. gel., yellow color, no pp't.	13.	Oxyquinoline sulfate	.1%	Strong gel., light yellow color, pp't.

No.	Name	Concentration	Physical prop. in gelatin sol. after cooling
15.	Chloramine	.1%	Weak gel., white turbidity, no pp't.
16.	Alcohol	8%	Med. gel., colorless, no pp't.
18.	Copper sulfate	.001%	Strong gel., colorless, no pp't.
21.	Hydrogen peroxide	3%	Strong gel., colorless, no pp't.
22a.	Methyl hydroxy benzoate	.15%	Weak gel., colorless, no pp't.
22b.	Methyl hydroxy benzoate	.025%	Weak gel., colorless, no pp't.
22c.	Methyl hydroxy benzoate	.25%	Weak gel., colorless, no pp't.
23a.	Ethyl hydroxy benzoate	.15%	Weak gel., colorless, gran. pp't.
23b.	Ethyl hydroxy benzoate	.25%	Weak gel., colorless, gran. pp't.
24a.	Propyl hydroxy benzoate	.15%	Med. gel., colorless, cryst. pp't.
24b.	Propyl hydroxy benzoate	.25%	Med. gel., colorless, cryst. pp't.
25a.	Butyl hydroxy benzoate	.15%	Med. gel., colorless, cryst. pp't.
25b.	Butyl hydroxy benzoate	.25%	Med. gel., colorless, cryst. pp't.
26.	Quinine ethyl carbonate	.05%	Med. gel., colorless, no pp't.

No.	Name	Concentration	Physical prop. in gelatin sol. after cooling
15.	Chloramine	.1%	Strong gel., colorless, no pp't.
16.	Alcohol	8%	Strong gel., colorless, no pp't.
18.	Copper sulfate	.001%	Strong gel., cloudy, no pp't.
21.	Hydrogen peroxide	3%	Weak gel., colorless, no pp't.
22a.	Methyl hydroxy benzoate	.15%	Strong gel., colorless, no pp't.
22b.	Methyl hydroxy benzoate	.025%	Strong gel., colorless, no pp't.
22c.	Methyl hydroxy benzoate	.25%	Strong gel., colorless, no pp't.
23a.	Ethyl hydroxy benzoate	.15%	Strong gel., colorless, slight pp't.
23b.	Ethyl hydroxy benzoate	.25%	Strong gel., colorless, slight pp't.

septic should have the following characteristics: (1) It must be effective against all types of micro-organisms causing decomposition. (2) It must be soluble in the concentration used. (3) It must not be toxic internally or externally depending upon where it is used and the concentration in which it is employed. (4) It must be compatible, must not alter the character of the preparation as far as objectionable odor, color, taste, etc., and it must be practically neutral so that it will not alter the pH of the preparation. (5) The cost of the preservative should not increase the price of the preparation to any marked extent. (6) The developed inhibiting effect must be lasting and therefore it may not be possible to depend on volatile substances, the effects of which disappear after evaporation.

Procedure

(A) On March 10, 1939, the acid type gelatin series was prepared. The gelatin used in this series was 250 Bloom, porkskin gelatin from an acid treated precursor. In order to obtain a pH of 3-4, 75 mgm. of tartaric acid were added to each gram of gelatin used. (The gelatin was employed in a 1 per cent. solution.) In preparing the gelatin solutions, the proper amount of gelatin was weighed, placed on the surface of the water at room temperature, and allowed to soak for a few minutes. The quantity of tartaric acid necessary for adjustment of the pH was added, and a few minutes later the mixture was heated until the gelatin was dissolved. The required amount of the different preservatives was added separately to each of the respective containers to obtain the desired concentration and the mixtures were heated until the preservative in each instance was completely dissolved. After cooling to room temperature the physical properties of the mixtures thus prepared were noted. (See chart 1.)

Each mixture containing a different preservative or a different concentration of the same preservative was equally distributed into eight wide-mouthed four-ounce glass containers which were inoculated with 0.1 cc. of a 10 cc. aqueous suspension of a slant of a forty-eight hour culture of the following micro-organisms respectively: Staphylococcus aureus, Bacillus subtilis, Proteus vulgaris, a pink

yeast, Penicillium glaucum (a blue green mold), and a suspension of dust from the pharmaceutical laboratory. The bacteria were grown on agar medium and the yeast and the mould were grown on Sabouraud's agar medium. The dust was used directly from the aqueous suspension, a sample of which was cultured to prove that viable organisms were present.

The two remaining containers were not inoculated and served as controls for the respective preservative. The cap of one of these controls was screwed down tightly so as to exclude the entrance of air; whereas the cap to the other control container was left loose so that air could enter. The caps in each of the six inoculated containers of each set were also left loose. This constant exposure to the air was employed as a practical rigid test for the effectiveness of a given preservative, as the air in the laboratory where these containers were kept was laden with mold spores, as revealed by control plates.

Three controls in duplicate for the entire series without the use of a preservative were also included. The cap of one of these control bottles was screwed down tightly, on another it was left loose, and on the third the cap was completely removed.

Macroscopic readings for growth were made at intervals of approximately one month during a four-month test period. The readings which were dubious were subcultured on agar and Sabouraud agar slants respectively and the cultures were examined for visible growth after two weeks of incubation at room temperature.

(B) On March 18, 1939, the basic type gelatin series was prepared. The gelatin used in this series was 250 Bloom, bone gelatin from an alkali treated precursor. In order to obtain a pH of 7-8, one-half gram of $NaHCO_3$ was added to each gram of gelatin. (The gelatin was used in a 1 per cent. solution.) The exact procedure as outlined for the acid type gelatin was then followed with the exception that the $NaHCO_3$ was added to the cooled mixture, as $NaHCO_3$ decomposes when heated.

Findings

The following charts give the results of each monthly reading of both the A and the B type gelatin solutions during the four-month test period.

CHART 2

EXPERIMENTAL DATA OBTAINED 17 DAYS

	Preservative No.	1	2	3	4	5	7	8	9	11	12	13	15	16	18	21	22a	22b	22c	23a	23b	24a	24b	25a	25b	26			
(A) Acid Type	Staphylococcus aureus	—	—	+	—	—	—	+	—	—	—	—	+	—	—	—	—	—	+	—	—	—	—	—	—	+	Controls without preservative		
	Bacillus subtilis	—	—	+	—	—	—	—	—	—	—	—	+	—	—	—	—	—	+	—	—	—	—	—	—	—		Open container	+
	Proteus vulgaris	—	—	+	—	—	—	+	—	—	—	—	—	—	—	—	—	—	+	—	—	—	—	—	—	+		Closed container	+
	Pink yeast	—	—	—	—	—	—	—	—	—	—	—	+	—	—	—	—	+	+	—	—	—	—	—	—	—			
	Penicillium glaucum	—	—	—	—	+	—	—	—	—	—	—	+	—	+	—	—	—	—	—	—	—	—	—	—	+			
	Dust	—	—	—	—	+	—	—	—	—	—	—	+	—	+	—	—	+	—	—	—	—	—	—	—	+			
	Control (open)	—	—	—	—	—	—	+	—	—	—	—	+	—	+	—	—	—	—	—	—	—	—	—	—	+			
	Control (closed)	—	—	—	—	—	—	—	—	—	—	—	+	—	—	—	—	—	—	—	—	—	—	—	—	—			
(B) Basic Type	Staphylococcus aureus	+	—	—	—	—	+	—	—	—	—	+	+	—	+	+	—	+	—	—	—						Controls without preservative		
	Bacillus subtilis	+	—	—	—	—	+	—	—	—	—	+	+	—	+	+	+	+	—	—	—							Open container	+
	Proteus vulgaris	+	—	—	—	—	+	—	—	—	—	+	+	—	+	+	+	+	—	—	—							Closed container	+
	Pink yeast	+	—	—	—	—	+	—	—	—	—	+	+	—	+	+	+	+	+	—	—								
	Penicillium glaucum	+	—	—	—	—	+	—	—	—	—	+	+	—	+	+	+	+	—	—	—								
	Dust	+	—	—	—	—	+	—	—	—	—	+	+	—	+	+	+	+	—	—	—								
	Control (open)	+	—	—	—	—	+	—	—	—	—	+	+	—	+	+	—	+	—	—	—								
	Control (closed)	—	—	—	—	—	+	—	—	—	—	+	—	—	+	—	—	+	—	—	—								

Note: + represents growth
— represents no growth
L represents liquefaction

CHART 3

EXPERIMENTAL DATA OBTAINED 45 DAYS

	Preservative No.	1	2	3	4	5	7	8	9	11	12	13	15	16	18	21	22a	22b	22c	23a	23b	24a	20b	25a	25b	26
(A) Acid Type	Staphylococcus aureus	—	—	+	—	—	—	+	—	—	—	—	+	—	—	+	+	—	+	—	—	—	—	—	—	+
	Bacillus subtilis	—	—	+	—	—	—	—	—	—	—	—	+	—	—	+	+	—	+	—	—	—	—	—	—	—
	Proteus vulgaris	—	—	+	—	—	—	+	—	—	—	—	+	—	—	+	+	—	+	—	—	—	—	—	—	+
	Pink yeast	—	—	—	—	—	—	—	—	—	—	—	+	—	—	+	+	+	+	—	—	—	—	—	—	—
	Penicillium glaucum	—	—	—	—	—	—	+	—	—	—	—	+	—	+	+	—	—	+	—	—	—	—	—	—	+
	Dust	—	—	—	—	+	—	—	—	—	—	—	+	—	+	+	—	+	+	—	—	—	—	—	—	+
	Control (open)	—	—	—	—	—	—	+	—	—	—	—	+	—	+	+	—	—	+	—	—	—	—	—	—	+
	Control (closed)	—	—	—	—	—	—	—	—	—	—	—	+	—	—	+	—	—	+	—	—	—	—	—	—	—
(B) Basic Type	Staphylococcus aureus	+	—	—	—	—	+	—	—	—	—	+	+	—	+	+	+	+	—	—	—					
	Bacillus subtilis	+	—	—	—	—	+	—	—	—	—	+	+	—	+	+	—	+	—	—	—					
	Proteus vulgaris	+	—	—	—	—	+	—	—	—	—	+	+	—	+	+	—	+	—	—	—					
	Pink yeast	+	—	—	—	—	+	—	—	—	—	+	+	—	+	+	+	—	+	—	—					
	Penicillium glaucum	+	—	—	—	—	+	—	—	—	—	+	+	—	+	+	+	+	+	—	—					
	Dust	+	—	—	—	—	+	—	—	—	—	+	+	—	+	+	+	+	—	—	—					
	Control (open)	+	—	—	—	—	+	—	—	—	—	+	+	—	+	+	+	+	—	—	—					
	Control (closed)	+	—	—	—	—	+	—	—	—	—	+	+	—	+	—	—	+	—	—	—					

Controls without preservative
Open container + +
Closed container

Note: + represents growth
— represents no growth
L represents liquefaction

CHART 4

EXPERIMENTAL DATA OBTAINED 75 DAYS

	Preservative No.	1	2	3	4	5	7	8	9	11	12	13	15	16	18	21	22a	22b	22c	23a	23b	24a	24b	25a	25b	26		
(A) Acid Type	Staphylococcus aureus	—	—	+	—	—	—	+	—	—	—	—	+	—	—	+	—	—	+	—	—	—	—	—	—	+	Controls without preservative	
	Bacillus subtilis	—	—	+	—	—	—	—	—	—	—	—	+	—	—	+	—	—	+	—	—	—	—	—	—	+	Open container	+
	Proteus vulgaris	—	—	+	—	—	—	+	—	—	—	—	+	—	—	+	—	—	+	—	—	—	—	—	—	+	Closed container	+
	Pink yeast	—	—	—	—	—	—	—	—	—	—	—	+	—	—	+	+	+	+	—	—	—	—	—	—	+		
	Penicillium glaucum	—	—	—	—	—	—	+	—	—	—	—	+	—	+	+	—	—	+	—	—	—	—	—	—	+		
	Dust	—	—	—	—	—	—	—	—	—	—	—	+	—	+	+	—	+	+	—	—	—	—	—	—	+		
	Control (open)	—	—	—	—	—	—	+	—	—	—	—	+	—	+	+	—	—	+	—	—	—	—	—	—	+		
	Control (closed)	—	—	—	—	—	—	—	—	—	—	—	+	—	—	+	—	—	+	—	—	—	—	—	—	—		
(B) Basic Type	Staphylococcus aureus	+	—	—	—	—	+	—	—	—	—	+	+	—	+	+	+	+	+	—	—						Controls without preservative	
	Bacillus subtilis	+	—	—	—	—	+	—	—	—	—	+	+	—	+	+	+	+	+	—	—						Open container	+
	Proteus vulgaris	+	—	—	—	—	+	—	—	—	—	+	+	—	+	+	+	+	+	—	—						Closed container	+
	Pink yeast	+	—	—	—	—	+	—	—	—	—	+	+	—	+	+	+	+	+	—	—							
	Penicillium glaucum	+	—	—	—	—	+	—	—	—	—	+	+	—	+	+	+	+	+	—	—							
	Dust	+	—	—	—	—	+	—	—	—	—	+	+	—	+	+	+	+	+	—	—							
	Control (open)	+	—	—	—	—	+	—	—	—	—	+	+	—	+	+	+	+	+	—	—							
	Control (closed)	+	—	—	—	—	+	—	—	—	—	+	+	—	+	—	—	+	+	—	—							

Note: + represents growth
— represents no growth
L represents liquefaction

CHART 5

EXPERIMENTAL DATA OBTAINED 105 DAYS

	Preservative No.	1	2	3	4	5	7	8	9	11	12	13	15	16	18	21	22a	22b	22c	23a	23b	24a	24b	25a	25b	26	
(A) Acid Type	Staphylococcus aureus	—	—	+	—	—	—	+	—	—	—	—	—	—	+	+	+	—	+	—	—	—	—	—	—	+	
	Bacillus subtilis	—	—	+	—	—	—	—	—	—	—	—	+	—	+	+	+	+	+	—	—	—	—	—	—	+	
	Proteus vulgaris	—	—	+	—	—	—	+	—	—	—	—	+	—	+	+	+	—	+	—	—	—	—	—	—	+	
	Pink yeast	—	—	—	—	—	—	—	—	—	—	—	+	—	+	+	+	+	+	—	—	—	—	—	—	+	
	Penicillium glaucum	—	—	—	—	—	—	+	—	—	—	—	+	—	+	+	—	+	+	—	—	—	—	—	—	+	
	Dust	—	—	—	—	+	—	—	—	—	—	—	+	—	+	+	—	+	+	—	—	—	—	—	—	+	
	Control (open)	—	—	—	—	—	—	+	—	—	—	—	+	—	+	+	—	—	+	—	—	—	—	—	—	+	
	Control (closed)	—	—	—	—	—	—	—	—	—	—	—	+	—	+	+	—	—	+	—	—	—	—	—	—	—	
	Controls without preservative: Open container	+																									
	Controls without preservative: Closed container	+																									
(B) Basic Type	Staphylococcus aureus	+	—	—	—	—	+	—	—	—	—	+	+	—	+	+	+	+	+	—	—						
	Bacillus subtilis	+	—	—	—	—	+	—	—	—	—	+	+	—	+	+	+	+	+	—	—						
	Proteus vulgaris	+	—	—	—	—	+	—	—	—	—	+	+	—	+	+	+	+	+	—	—						
	Pink yeast	+	—	—	—	—	+	—	—	—	—	+	+	—	+	+	+	+	+	—	—						
	Penicillium glaucum	+	—	—	—	—	+	—	—	—	—	+	+	—	+	+	+	+	+	—	—						
	Dust	+	—	—	—	—	+	—	—	—	—	+	+	—	+	+	+	+	+	—	—						
	Control (open)	+	—	—	—	—	+	—	—	—	—	+	+	—	+	+	+	+	+	—	—						
	Control (closed)	+	—	—	—	—	+	—	—	—	—	+	+	—	+	+	+	+	+	—	—						
	Controls without preservative: Open container	+																									
	Controls without preservative: Closed container	+																									

Note: + represents growth
— represents no growth
L represents liquefaction

Note

In many of the preservatives tested as well as in the controls, there was a progressive liquefaction of the gelatin jellies. This liquefaction was not due to bacterial growth since subculturing a number that had showed no growth, but had liquefied, indicated that they were sterile. Later, quantities of a 1 per cent. gelatin solution were heated at 100 degrees C. for varying periods of time, and when cool the degree of gelation was at once noted. This seemed to indicate that sufficient heating hydrolyzed the gelatin and although it was less viscid at first, little change took place with aging; whereas if not heated sufficiently a slow hydrolysis took place resulting in a lowering of the viscosity of the gelatin solution upon aging.

Effective Preservatives

The following preservatives in 1 per cent. gelatin solutions were found to be effective against the growth of the typical resistant bacteria and fungi found in the air:

	Concentration
For (A) acid type gelatin:	
1. Sodium benzoate	0.1%
2. Thymol	0.1%
4. Chlorobutanol	0.5%
7. Sodium salicylate	0.1%
9. Cresol	0.4%
11. Parachlormetaxylenol	0.1%
12. Parachlormetacresol	0.25%
13. Oxyquinoline sulfate	0.1%
16. Alcohol	8%
23a. Ethyl hydroxy benzoate*	0.15%
24a. Propyl hydroxy benzoate*	0.15%
25a. Butyl hydroxy benzoate*	0.15%
For (B) basic type gelatin:	
2. Thymol	0.1%
3. Chlorothymol	0.1%
4. Chlorobutanol	0.5%
5. Betanaphthol	0.2%
8. Phenol	0.5%
9. Cresol	0.4%
11. Parachlormetaxylenol	0.1%
12. Parachlormetacresol	0.25%
16. Alcohol	8%
23a. Ethyl hydroxy benzoate*	0.15%

*In the case of the esters of p. hydroxy benzoates the required concentration for effective preservation is somewhat less than that stated since some precipitation of this material beyond its solubility took place. (See Chart 1.)

Summary

1. The effectiveness of chemical preservatives were tested in 1 per cent. gelatin solutions.

2. Two types of gelatin were used, namely: Pharmagel A and Pharmagel B.

3. Gelatin solutions with a definite concentration of each preservative were inoculated respectively with a suspension of the various resistant bacteria and fungi found in the air.

4. Free access of air was allowed into these solutions during the four-month test period.

5. Macroscopic readings and subcultures for growth were made at intervals of approximately one month.

6. The chemicals and the concentrations found effective are recorded.

Acknowledgment

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THE CONQUEST OF HEMOPHILIA

By Edward Podolsky, M. D.

ALEXEI, the last of the Tsarevitches had fallen while at play and had inflicted a slight injury to his leg. He began to bleed. The Empress became white with fear. For ten years she had dreaded just such a moment. She knew what bleeding meant. Her family had been afflicted with hemophilia for generations. Hemophilia is a condition in which the clotting of the blood is defective. Once a wound, even a slight one, is inflicted, the body is drained of blood and death is the natural outcome.

Dr. Remezov was sent for. He came in great haste. He knew that the Tsarina's grandfather had died of a bleeding wound. Dr. Wolf, the famous Viennese specialist, was sent for, and he managed to stanch the flow of blood. Together with Dr. Remezo he had accomplished a veritable miracle.

Hemophilia is a dread disease which hangs over the heads of many families. It is a constant spectre at the household of the former King Alphonso, of Spain. Already it has claimed one of his sons. The former king himself almost lost his life because of it. Medical science has been trying for years to find means to conquer hemorrhage. The story of this search is one of the most fascinating in scientific annals.

Medicines From Snakes

Among the latest remedies used to control excessive bleeding, the most interesting are derived from snakes. It was in 1931 that Drs. Stockton and Franklin found that snake poison was of value in a bleeding disease known as purpura. In this disease, which is characterized by excessive loss of blood which often results fatally, there is no drug which is of great value. However, Drs. Stockton and Franklin were able to get good results with the treatment of snake venom.

Two years later, in 1933, snake venom was given another opportunity to prove its healing qualities as far as controlling excessive bleeding was concerned. Drs. Peck and Goldberger treated twelve patients with snake venom for functional bleeding from the uterus, a most devitalizing and certainly serious ailment. They found that snake venom acted like a charm. Bleeding was more promptly con-

trolled than by other means. It required six injections of the snake venom which were given over a period of two to three weeks. With the control of bleeding there was a rapid improvement in the anemia and other unfavorable signs and symptoms which this disease brings on. The venom of Ancistrodon piscivorus was used in sterile salt solution.

Another interesting discovery of the coagulating effects of snake venom was made in 1934 in England by two English physicians, Drs. McFarland and Barnett. They undertook to make a careful study of the hemostatic possibilities of snake venom. They found that Russel's viper was the best suited for this particular purpose. It was used with signal success in stopping bleeding in dental extraction, removal of the tonsils and during serious major operations on the abdomen in which capillary oozing is sometimes quite a serious complication.

In hemophiliacs or bleeders, snake poison is sometimes a godsend. Within recent years it has been used with signal success in several cases. The venom seems to possess certain elements which the blood of the hemophiliac lacks.

The Magic of the Bird's Muscle

Medical science has begun to advance so rapidly along this front, that the great fear from bleeding has been dissipated to a great extent. Confronted with a hemorrhage, even a serious one, the doctor can now stop it almost instantly, under certain conditions, by the simple application of the muscle of a bird. This magic muscle has even removed a serious peril involved in certain operations—that of the possibility of subsequent blood clot.

The blood is not, in a true sense, a liquid. It is composed of a solid part formed by microscopic elements known as globules, swimming in a liquid substance called plasma.

The blood as soon as it emerges from the vessels undergoes physico-chemical modifications ending in its coagulation. The clot is made up of a substance termed fibrin, presenting the aspects of meshes or links close together, imprisoning the globules. It appears that fibrin is the product of the action of a substance technically known as thrombin upon another substance normally in the blood plasma and known as fibrogen, giving rise to fibrin.

The tissues, and especially the muscular tissues of birds contain the two substances—the plasma containing, for its part, only the

fibrogenic substances. If we previously remove the blood of a bird in such a way that it has no contact with the tissue mass, the blood will remain liquid indefinitely, coagulation not being possible.

These considerations have led doctors to utilize the coagulating power of the muscle of the bird. Hemorrhages are a real difficulty for the surgeon and at the same time a great peril for the patient. All physical expedients hithertofore adopted proving insufficient, Dr. de Martel and his aides had recourse to a biological procedure based upon the hemostatic action of the muscle of a bird.

Thanks to this procedure it has been possible to check hemorrhage that otherwise must prove fatal. Other experts have used bird muscles in various cases, especially to stop hemorrhages following dental operations, on the ear, and on the throat. Upon hemophiliacs bird muscle has been used with signal success.

Any bird almost can be used, but Dr. de Martel has employed the pigeon, because it can be obtained readily, and because its maladies, which are rare, occasion symptoms sufficiently definite not to be missed. Bird muscle and snake poison are among the most effective of biological remedies to check uncontrollable bleeding.

The Healing Serums

For many years the fight against life-destroying hemorrhages had been going on. In 1907 Dr. P. Emile Weil had made known the results of his work with fresh animal and human serum in the treatment of hemorrhages. He had treated a great many bleeders of all kinds by injecting the serums with remarkable results.

Two years later Dr. Wirth reported the case histories of twenty-three patients suffering from various types of bleeding not due to hemophilia in which he found that serum was instrumental in stopping the bleeding. At about the same time Dr. Leary also used fresh animal serum for the treatment of hemorrhage in a series of fifteen cases. This group included all the varieties of serious bleeding: jaundice, hemorrhage of the newborn, hemophilia, purpura, post-operative hemorrhage, bleeding from the uterus and the hemorrhage of typhoid ulcers. The results were most gratifying.

In 1910 Dr. John E. Welch used fresh human serum with very good results in hemorrhage of the newborn. Three years later Drs. Clowes and Busch prepared a powder from animal serum which retained its activity for a long time and was as effective as human serum.

This was a great improvement over the previous forms of serum and was fully as effective in stopping excessive bleeding.

In 1919 Dr. Hamilton made the biggest step forward in the serum treatment of bleeding when he combined the virtues of all the sera used heretofore into one physiologically balanced solution, which was effective in most cases of hemorrhage.

The Virtues of Coagulen

Coagulen has also been used through the years with good results in the treatment of bleeding. It was introduced by Dr. Fonio in 1913 who was induced to undertake the preparation of a blood coagulent at the suggestion of Dr. Kocher, who had long used muscle tissues to control bleeding in brain operations by local application.

Coagulen needed but to be applied directly to the bleeding area to control bleeding. Dr. Fonio was able to control excessive loss of blood in many operations by applying coagulen directly to the wound. The interest in Dr. Fonio's hemorrhage arresting substance spread widely among surgeons who used it at the first opportunity and reported their results.

Thus in 1913 Dr. Obermuller employed coagulen by local application as a spray and by tampon in a large number of nose and throat conditions and found it useful for the control of bleeding. One year later Dr. Barth found that coagulen was very valuable to control bleeding in the nose and throat and spoke very enthusiastically about its merits.

At about the same time Dr. de Taranowsky became interested in coagulen on his visit to Dr. Kocher's clinic in Germany and when he returned to Chicago he used it by local application in surgery. He found that coagulen shortened the time of the operation, simplified the technic and required fewer ligatures.

In 1915 Dr. Halpern found that coagulen was useful in controlling postoperative bleeding. It was also of value in stopping bleeding from cancer of the lip, tongue and breast, when other measures had failed. As time went on doctors throughout the world became acquainted with coagulen and used it in the treatment of all types of bleeding with good results. At the present time it is one of the most valuable of our remedies against bleeding.

Lung Extract as a Remedy

In 1916 Dr. Rudolf Fischl made an extract of lung tissue which he began to experiment with in controlling excessive bleeding. This extract which he named clauden was found to be of undoubted value in the treatment of a great variety of bleeding diseases.

One year later Dr. Kafemann used clauden in a large number of cases of bleeding from the nose and throat and found that he was able to control bleeding which would not yield to other measures. In 1918 Dr. Weinberg applied clauden locally to control bleeding from a bladder tumor, by introducing the remedy directly into the bladder through a rubber tube. The bleeding ceased.

Through the years clauden increased in popularity. It came to be used in very serious types of internal bleeding. In 1928 Dr. Thaler reported the use of clauden in the treatment of bleeding from the lungs in tuberculosis with very good results. It was also used to check bleeding of other organs afflicted with tuberculosis. Various types of blood diseases giving rise to a tendency to bleeding have yielded to clauden.

Excessive bleeding no longer holds the terrors it did twenty-five years ago. It is not necessarily fatal. Even bleeding from the lungs or stomach may be controlled by means of drugs which research workers have brought from the laboratories. There is now more than one drug which has demonstrated its value in controlling excessive hemorrhage. Had the last of the Tsarevitches lived today, and had he had his fall with the subsequent bleeding, the chances of controlling it, even if he were a hemophiliac, would have been much greater today than at the time when it actually occurred.

CHEMICAL AND PHYSICAL PROPERTIES OF ARGAN OIL

By W. H. Dickhart*

ARGAN OIL is an oil pressed from the hard kernels of the plum-like drupes of the Marocco ironwood or Argan tree of Marocco. It has an odor of burnt almonds, a bland nutty flavor and color of cottonseed oil. It develops a dark crimson color on shaking the oil with concentrated nitric acid.

The chemical characteristics of the oil resemble olive, peanut and teaseed oil. It is similar to olive oil in titre and melting point of the solid fatty acids; but is different in having the lead soaps not completely soluble in hot ethyl ether, forming a turbid solution while those of olive are entirely soluble and form a clear solution.

On the other hand, the oil is like peanut in iodine value and Bellier test, precipitating a heavy cloud. The Modified Renard-Tolman Method (U. S. P.) for isolating arachidic acid produced an acid which was first thought to be arachidic, it having the same crystalline structure and insoluble in cold absolute ethyl alcohol. If the acid had been arachidic, it would have been equivalent to approximately 12.60 per cent. peanut oil present; but the melting point was found to be 65 degrees C. instead of 71-72 degrees C. and an iodine value of 21.7.

The oil develops a pink color with the modified Liebermann-Burckhard test for teaseed oil (Department of Agriculture test). The only difference is the color formed is not quite as dark; but more stable.

The chemical and physical characteristics were found to be as follows:

Moisture	0.08%
Insoluble impurities	0.01%
Specific gravity at 25° C.	0.9160
Iodine Value (Wijs)	96.4
Saponification Value	190.4
Titre	24.8° C.
Free fatty Acid (Calc. to Oleic)	1.50%
Unsaponifiable matter (Pet. Ether)	0.36%
Acid Value	3.0
Kries test for rancidity	Negative

*Official chemist for New York Mercantile Exchange, New York.

Halphen test for cottonseed oil	Negative
Bellier test	Positive
U. S. P. for Peanut(?)	Positive
Teaseed oil test	Positive
Artificial Color	Negative
Color (Lovibond 5¼ inches)	35 yellow, 7.4 red
Acetyl Value	1.81
Nitric acid color test	Crimson
Total Fatty Acids (Pet. Ether)	90.72%
Neutralization No. of fatty acids	190.0
Iodine Value of mixed fatty acids	99.7
Melting point of mixed fatty acids (CT)	27.0° C.
Saturated acids (Lead ether method)	12.83%
Melting point of Solid fatty acids (CT)	55.6° C.
Unsaturated acids (Lead ether method)	77.89%
Iodine Value of Liquid fatty acids	115.2
Unidentified acid	0.63%
Iodine Value of Unidentified acid	21.7
Melting point of Unidentified acid (CT)	65.0° C.

The above sample was received from Marocco and guaranteed to be authentic by a reliable authority.

Algin Finds New Uses in Pharmacy. A. Bergy. *Amer. Prof. Pharm. 5,* 367 (1939). Algin, a sodium salt of alginic acid, obtained from seaweed, heretofore used in the textile and paper industries, is now available for use in the food, drug and cosmetic industries. Its tenacious, gelatinous properties make it especially suitable for hand gels and lotions, ointment bases, pomades and greaseless creams. Consistency and adhesion are variable according to the ratio of calcium citrate or calcium gluconate added to a dilute solution of algin, which is colorless, odorless and tasteless, and completely soluble in water.

Glycerin, ethylene glycol, the wetting agents (amines) and solutions of alkalies and alkali carbonates are compatible with algin solutions which, in themselves, are neutral or slightly alkaline. Concentrated mineral acids cause coagulation. Large quantities of water-miscible alcohols may do the same. A preservative may be added to prevent decomposition. J. E. K.

ABSTRACTS FROM AND REVIEWS OF THE LITERATURE OF THE SCIENCES SUPPORTING PUBLIC HEALTH

Bacteriology . . . . **Louis Gershenfeld, B. Sc., Ph M.**
Biology . . . . . **Marin S. Dunn, Ph. D.**
Chemistry . . . . . **Arthur Osol, Ph. D.**
Pharmacy . . . . . **E. Fullerton Cook, Ph. M.**
and their assistants

Comparison of Several Calcium Salts as to Their Effect Upon Lactose Utilization. H. S. Mitchell, G. M. Cook, K. L. O'Brien. Through *J. Biol. Chem. 128,* lxxi (1939). The relative merits of the various calcium salts used in calcium therapy have recently attracted some attention. Repeated observations by the authors indicate that the gluconate differs from other calcium salts in its specific effect upon the digestion and absorption of lactose. In their experiments rats were fed an adequate ration containing 60 per cent. lactose, plus 1.0 or 0.5 per cent. of calcium added in the form of six different calcium salts: tricalcium phosphate, carbonate, citrate, lactate, levulinate and gluconate. Rats on any of the first five calcium salts showed as good growth, less diarrhea in general, about the same degree of galactemia and a similar incidence of cataract as on the plain 60 per cent. lactose ration. With calcium gluconate fed at the 1.0 per cent. calcium level few rats survived; these grew but little, had severe diarrhea, low blood sugar, and no lenticular changes whatever. With 0.5 per cent. calcium (5.6 per cent. calcium gluconate) the survival was better, growth poor, diarrhea moderate, lenticular changes few if any. These criteria all indicate that calcium gluconate prevents most of the lactose from leaving the intestinal tract. Since calcium gluconate shows no inhibitory effect upon the absorption of the simple sugars glucose or galactose, the problem must concern the breakdown of the disaccharide. Sodium gluconate, fed at corresponding levels, exerted a similar deleterious effect with only one out of eight rats surviving the experiment.

It would seem that the gluconate radical in some way inhibits lactose activity. For this reason, the therapeutic use of calcium gluconate and lactose together is questioned. L. F. T.

Sound Waves—A New Tool for Food Manufacturers. L. A. Chambers. *Food Industries,* Mar. 1938. This article points out some physical and chemical changes which are produced by subjecting certain chemicals to intense sound waves. Most of the products which have been tested are liquids, and the frequencies employed vary from the audible sound waves vibrating 360 times per second, to those beyond the audible region vibrating 30,000 times per second.

For example, when milk is treated with sound waves vibrating 360 times per second the curd tension is reduced so that the curd formed by the action of stomach secretions is no longer large and firm but is small, soft, and flocculent. Curds of the latter type are necessary in the feeding of infants and are desirable in the diets of certain adults. In the case of ice cream mixes the use of intense sound vibrations has been developed to a point of commercial practicability. In this case as in that of milk the immediate action is to disperse the fat particles, and the result is a smooth texture in the finished ice cream. When milk or cream is treated with sound waves the churning occurs rapidly and the butter is recovered, leaving a negligible amount of fat in the remaining buttermilk.

When the right frequency and intensity of sound wave is selected the process can be used in all types of emulsions. The mechanism seems to be that a tremendous pressure is put on the particles being emulsified which breaks them up into smaller and smaller particles. The process takes place by what is known as "sonic cavitation," that is when the rarefied sound wave travels through the liquid it tends to produce bubbles or cavities within the liquid. When the compression wave strikes this same point, the cavities not only collapse but have exerted on them a tremendous pressure amounting, according to the best estimates, to thousands of pounds to the square inch. This change in pressure is much greater than can be secured for homogenization by methods now commonly used. It was found that the size of the particle varied inversely with the frequency used. That is the higher the frequency the smaller the particle that could be produced.

The sterilizing and bactericidal action produced by the sound waves seems so important that the results will be quoted directly from the article:

"One of the effects of intense sound waves first observed was the killing of bacteria in liquid suspensions. This phenomenon appears to be simply another instance of the disruptive action of cavitation

collapse. It has been found that pure cultures of bacteria, both harmless and pathogenic can be sterilized by prolonged exposure to sonic cavitation produced by any sound frequency from 120 cycles upward. The organisms are simply torn to unorganized debris by the force of cavitation collapse.

"If this bactericidal action can be applied economically to the sterilization of fruit juices, beer, milk or other liquids, it may prove of considerable importance. Unfortunately hopes in this direction have not yet been realized practically. The present status of the problem may be summarized as follows: Liquids may be sterilized completely by prolonged exposure to intense sound waves. The duration of the exposure necessary to sterilize is inversely related to the frequency."

Certain chemical reactions are described which either do not occur at all normally or which proceed at a very slow rate. Water has been changed to hydrogen peroxide in the presence of oxygen, certain proteins have been denatured, and the following processes speeded up: hydrolyses, saponification, and esterfication. It was also found that the maturing of distilled spirits involving essentially the formation of esters by combination of higher alcohols and aldehydes with acids derived from wood plus a certain amount of oxidation were accelerated. For example it was found that raw spirits containing infusion extracts of charred white oak could be brought to maturity in a few hours by active sonic cavitation.

These and many other physical and chemical changes which should prove of interest to the chemist, the pharmacist, and the bacteriologist are described, all of which were produced by intense sound waves. D. P. LE G.

Sulfapyridine in the Treatment of Gonorrhea. E. N. Cook and E. B. Sutton. *Proc. Staff Meetings, Mayo Clinic 14,* 293 (1939). Eighteen men and women suffering from acute or chronic gonorrhea were treated with sulfapyridine. In every case there was cessation of discharge in 1 to 14 days, with the average being 3.7 days. Negative cultures were obtained in 2 to 8 days, the average being 5 days. No failures were experienced and untoward reactions were but slight. The mildness of reactions was attributed to the low dosage

employed (45 gr. daily for 5 to 18 days) and the administration of the drug in milk.

Repeated leukocyte counts in ten cases showed no changes and the concentration of drug in the blood was 1-5.1 mg. per cent. From this study and a review of the literature the authors feel that sulfapyridine is indicated in the treatment of gonorrhea and that a much smaller dose is required than in pneumonia. L. F. T.

Mammary Carcinoma in the Rat With Metastasis Induced by Estrogen. C. F. Geschickter. *Science 89,* 35 (1939). In a previous communication pathologic changes in the mammary gland of the rat induced by estrogen and other hormones were reported. Further results have shown that a daily dosage of 200 gamma of estrone injected intramuscularly is most suitable for the detailed study of the mechanism of cancer production in the mammary gland. Microscopic cancer occurs within 150 to 200 days with such dosage. Cancer can be induced by the injection of smaller doses in 500 to 600 days (50 gamma) and 350 to 400 days (100 gamma). They can be obtained more quickly by implanting the crystalline hormone in the form of pellets (25 to 50 days).

With injections of the hormone in oil once daily the time required is inversely proportional to the size of the dose, the total dose being relatively constant.

In a parallel group of experiments an attempt was made to induce mammary carcinoma with other estrogenic substances. The compounds used were estradiol, estradiol propionate and diethyl stilboestrol. The experiments are still incomplete, but cancer was obtained in one rat injected with 200 gamma of diethyl stilboestrol daily for 100 days. This is significant because the substance has the physiological action of estrone but is not a sterol. This suggests that the mammary cancers induced by the injection of estrogenic substances are due to physiological changes produced rather than to the cancerogenic nature of the chemicals used. L. F. T.

Prostigmin in the Treatment of Deafness. Davis and Rommel. *Arch. Otolaryngol. 29,* 751. The use of Prostigmin in acute and chronic deafness and tinnitus aurium has been found to bring about definite and marked improvement. The value of Prostogmin in these disorders was systematically investigated after the accidental discovery of Rommel that the ticking of a bedroom "tickless" clock (ordinarily no louder than a watch) was clearly audible to him at a distance of eight feet following an injection of Prostigmin which he had taken for other reasons.

Twenty-eight patients with tinnitus aurium and acute blockage of the eustachian tube, most of whom had marked deafness, were given injections of 1 cc. of Prostigmin Methylsulfate, 1 :2000 solution, at intervals of 3 to 5 days, supplemented in most instances by catheterization of the Eustachian tube and by massage. There was rapid remission of the annoying symptoms, and few patients required more than five injections even when there had been loss of hearing for as long as a month. But two patients had recurrence of their symptoms, and in each case one injection of Prostigmin was followed by prompt improvement. In two acute cases Prostogmin alone was used with satisfactory results. In the one case all head noises disappeared after three injections, and in the other, tinnitus disappeared after four injections.

Thirty-three cases of chronic deafness were also treated with Prostigmin, 1 cc. of the 1 :2000 solution by injection, two or three times a week. Improvement was usually more gradual in the chronic than in the acute cases. Davis and Rommel state that "those whose condition is chronic require a longer time. . . . Progress is slow in many cases. We both have been tempted to give up the treatment for some patients, but improvement was brought about by persevering when hope seemed to have fled. . . . It is advisable to continue the treatment indefinitely for chronic conditions." Associated or causative disorders such as sinusitis, Eustachian tubal catarrh, and nasal obstructions which might prevent a favorable response or cause relapses were eradicated insofar as possible.

Prostigmin was also used with good results in trigeminal neuralgia. One patient has remained symptom-free for five months, and marked improvement has been noted in the others. Prostigmin is a novel treatment for this difficult disorder, and the results point the way

toward the possibly successful management of many similar nerve disorders.

Untoward effects occurred in only two of the total number of cases receiving Prostigmin. These two patients were middle-aged women who had marked hypertrophy of the thyroid gland, and one was in the menopause. Prostration and extreme nervousness followed each does so the drug was withdrawn. In the other cases undesirable by-effects were not observed even though some patients at the time the report was published had been receiving Prostigmin without interruption for 5 months.

Davis and Rommel discuss the reason for Prostigmin's effectiveness in deafness. They point out that the muscles of the ear and of the face have a common embryonic origin and a common innervation (trigeminal and facial nerves). Since the facial muscles in myasthenic patients regain normal function after the use of Prostigmin, it is suggested that a somewhat similar phenomenon may occur with the otologic muscles in deafness after a dose of Prostigmin. This might also explain the beneficial action of Prostigmin in trigeminal neuralgia.

Davis and Rommel conclude that "Prostigmin has real value against deafness and tinnitus aurium," and that "it has great possibilities against trifacial and other neuralgias, which deserve further study." They caution against the use of large doses or too frequent administration lest toxic effects be produced. Their study demonstrates the effectiveness of relatively small doses and the inadvisability of attempting to rush treatment.

SOLID EXTRACTS

By Ivor Griffith, Ph. M., Sc. D.

Despite the form in which this information is presented it may be accepted as trustworthy and up-to-date. Original sources are not listed but they may be obtained upon request.

Did you know that hot tea requires less sugar to sweeten it than does cold or iced tea? Did you know that if you have bitter medicine to take, rub your tongue with ice and you won't know you aren't dining on milk and honey.

Warmth is a stimulant to the taste buds. These taste buds are unevenly divided in the world of nature. An antelope has 50,000; a man has 3000; a cow has 15,000. The whale has only a few; he gulps his food so quickly that taste is no object. Among horned cattle, taste is important, and they scrupulously select the grasses they like. While man tastes only with his tongue, fishes taste with their whole body.

And since all of this is intended to be in good taste, did you also know that a baby tastes with the middle part of his tongue and an adult determines with the sides of his tongue whether food is pleasing or not.

There are four distinct tastes: sweet, salty, bitter and sour. The sweet taste is perceived on the tongue most quickly, because the buds reacting on sweets are located at the tip of the tongue. Next comes salt and then comes sour. Bitter things are tasted at the back of the tongue.

The taste can be trained. Tea tasters can tell the place of origin of a tea after a single tasting. Wine tasters can tell where the grapes were grown and whether they grew in a shady or in a sunny field.

Artificial musk of a sort has been made since 1888 from toluol. But a recent Dupont patent suggests that the long-sought goal of perfume chemists—to create a synthetic musk which will have the extraordinary fixative powers of the natural musk—is believed achieved by the disclosure of inventions by the late Dr. Carothers, director of the research that created nylon, the new fiber.

Cyclic esters having more than seven atoms in the ring constitute the new substance.

Real musk, which is fabulously expensive, is obtained from a strongly odorous substance secreted in a gland of the musk-deer and several other animals. It is imported largely from China or from Central Asia by way of Russia. A grain of musk will distinctly scent millions of cubic feet of air without any appreciable loss of weight; its odor is extremely penetrating and persistent. In its crude form it costs about as much as gold. It is an essential in perfume making, giving power and endurance to compounded perfumes.

Musk has also been used, as have many strong-smelling substances in the treatment of nervous diseases. Science may some day explain why asafoetida, castor, musk, sumbul, valerian, etc., seem to be effective in such treatment.

An unrecognized hormone, called "the specific metabolic principle" and produced by the middle part of the pituitary gland, has been chemically dissected from the tiny "master gland."

The new hormone speeds up the rate at which the body converts food, fuel or energy. This vital process is known as metabolism.

The new hormone stimulates metabolism quite independently of the thyroid gland. It does not work by first stimulating the thyroid, as does another pituitary hormone called the thyrotropic hormone. Doses of the hormone injected into rats, rabbit and guinea pigs from which the thyroid glands had been removed increased the metabolic rate within a few hours.

Fourteen major victories over disease within three years—that is the amazing record of a new chemical in today's warfare against germs. And the end is certainly not yet in sight, for fresh victories are reported in almost every issue of medical journals the world over.

The victories have been won with a chemical that was shoveled around a large German dye works for years before anyone suspected its possibilities as a life-saver for thousands of desperately sick patients. It is sulfanilamide.

This chemical was first introduced as Prontosil, a patented, inkred dye also available in the form of flat white pills. Before many

months, it turned out that the curative value of Prontosil was due to one of its chemical constituents, sulfanilamide. The chemists, however, have not stopped at this point. While physicians are using the relatively simpler sulfanilamide with impressive and spectacular success in treatment of many ails, research goes on in the laboratories in the hope of finding a supersulfanilamide.

The idea of the vitamin alphabet stretching from A to Z is no idle myth. It really does. Fortunately, however, one need not remember all of them when at the dinner table.

Vitamins V, X, and Z, to start at the wrong end of the alphabet, are only important in the nutrition of bacteria. Some of the other end-of-the-alphabet vitamins are a necessary part of insects' diets.

T is about as high as vitamins for higher animals go. Vitamin T is found in egg yolk and sesame oil. It increases the number of platelets in rat and human blood. Platelets play a part in making the blood clot so you won't bleed to death after a cut.

Now that the alphabet is exhausted numerals are being used in addition. Thus B_1, B_2, B_3, etc., etc.

"And when youth the dream departs
It takes something from our hearts
And it never comes again."

The chemist may some day discount the foregoing poetic effusion. For a vitamin discovery that may be an approach to man's eternal quest for continued youth has been made at the University of California.

Gray hair has been darkened and other signs of premature old age reversed by feeding concentrates of the vitamin, which is an unidentified member of the vitamin B family found in yeast, rice bran and liver. But the results, reported by Drs. Agnes Fay Morgan and Helen Davison Simms (Science, June 16) were obtained on rats, a black guinea pig and two young Boston bull pups.

Drunks—not ordinary ones, but those who were completely "out in serious alcoholic coma—were sobered up in two hours or less and able to walk alone within four hours by injection of sugar and the

diabetic remedy, insulin, research workers at a New York hospital reported recently.

This sobering-up treatment works for any intoxicated person, but the results are most startling in cases of acute alcoholism. Although the experimenters have tried it on persons not acutely intoxicated, it is only being used for serious cases where there is danger of the patient dying or being very ill for a long time.

Experiments are being conducted in breeding strains of tobacco with a lower nicotine content since efforts to remove the nicotine from the tobacco have not proved entirely satisfactory, either because the flavor and aroma of the tobacco were affected, or the reduction in the nicotine content was insignificant.

The fatal dose of nicotine is not definitely known but 2/3 of a drop (30-60 mg.) of the pure alkaloid will kill a man. Death of a bird results in a few seconds if a glass rod dipped in nicotine is held under its beak. A moderate but habitual smoker is tolerant to 16-20 mg. of nicotine (as vapor) per hour. Five grams of tobacco, equivalent to one cigar or 5 cigarettes, contains about 60 mg. of nicotine of which about 10 to 40 per cent. respectively, are evolved with the smoke and only 20 per cent. of this fraction finds its way into the system.

Many birds possess a number sense. If a nest contains four eggs one can safely be taken, but when two are removed the bird generally deserts. Every boy knows that somehow the bird can distinguish two from three. But this faculty is by no means confined to birds. In fact the most striking instance is that of the insect called the "solitary wasp." The mother wasp lays her eggs in individual cells and provides each egg with a number of live caterpillars on which the young feed when hatched.

Now the number of victims is remarkably constant for a given species of wasp; some species provide 5, others 12, others again as high as 24 caterpillars per cell. But most remarkable is the case of the Genus Eumenus, a variety in which the male is much smaller than the female. In some mysterious way the mother knows whether the egg will produce a male or a female grub and apportions the quantity of food accordingly; she does not change the species or size of the prey, but if the egg is male she supplies it with five victims, if female with ten.

BOOK REVIEWS

Done by persons, unafraid to upbraid, but perfectly willing to give praise where praise is really due.

Rancidity in Edible Fats. C. H. Lea, Ph.D. Low Temperature Research Station, Cambridge. 224 pages + index. ($4.00.) Chemical Publishing Co., New York, 1939.

This book apparently is based on a rather extensive report to the Food Investigation division of the Department of Scientific and Industrial Research of Great Britain.

The chemistry of fats is first discused in an interesting fashion, taking into account both the glyceride constituents as well as the non-saponifiable components; sterols, vitamins, etc. The main body of the book, however, is concerned with the nature, causes, and control of rancidity in facts and fat-containing foods. The action of micro-organisms, the relationship between chemical tests and rancidity, measurement of susceptibility to rancidity, the mechanism of auto-oxidation, factors influencing the rate of oxidation, etc., are all rather well presented.

Many references are given at the end of each chapter for those who wish to refer to original papers on the many pheonomena relating to fats. L. F. TICE.

"Foreign Markets for American Medicinal Products." C. C. Concannon and E. A. Chapman, Chemical Division, U. S. Bureau Foreign and Domestic Commerce. Trade Promotion Series—No. 193.

This is a compilation of reports received from U. S. Trade Commissioners and Consuls throughout the world. Persons interested in the market outside the United States for products of pharmaceutical laboratories of this country will find much of interest in this report. The report will repay a reading by any pharmacist for its incidental description of the practice of pharmacy in all parts of the world. These descriptions are, of course, those of laymen but they do convey effec-

tively the United States citizen's impression of how drug stores are conducted in foreign countries.

Also of interest is the description of the proportion of United States exports of pharmaceutical preparations which go to various countries and the relative importance in the export market of United States manufacturers with those of other countries. The effects of tariffs, quota restrictions and other trade barriers upon the export market for United States products are described, including the establishment by the manufacturers of this country of foreign plants for the complete or partial production of their products.

PAUL C. OLSEN.

American Medicine Mobilizes. By James Rorty. W. W. Norton & Co., Inc. 358 pages with index.

Periodically some layman gets steamed up over the existing situation in this country with regard to medical care and boils off a book about it. Rorty's is the current example of this. He has had it a long time in preparation. Sinister forces have pursued him. Mysterious powers have made it impossible for two publishers to do his book and he had recourse to a third. A briefcase full of damning documents was spirited away from him once when he returned from a trip away from New York to get it. Finally his book was met by a complete press boycott—not a single metropolitan newspaper would review it!

Of course the *New York Times* (May 21, 1939) offered it full-page play in its book review section with commendations signed by its distinguished scientific editor, Waldemar Kaempffert. *The Washington Daily News* offered no resistance whatever when the present writer suggested he do a review and it published that review forthwith (May 20, 1939). Undoubtedly other papers and periodicals will review the book as they get around to it.

Conspiracy is in the air, according to Rorty. The American Medical Association is a nasty old bunch of profit-mongering rascals. Dr. Morris Fishbein is civilization's main bête noire. The public's need for adequate and competent medical service goes unmet. But at last M-Day (the day of mobilization) appeared when the National Health Conference met and the future is bright with promise.

It is rather difficult to get the book's message, undoubtedly because the exigencies of finding a publisher unafraid of the sinister forces fighting its author ruthlessly compelled him to rewrite it considerably. In doing so not only did he ditch most of his more picturesque vocabulary but he also evolved a rather tortured form of organization, for the book begins at the end and ends at the beginning.

Naturally it would be more logical to show that medicine had an unfinished job and that many went uncared for; then to indicate that this had occurred because the American Medical Association has become a medical chamber of commerce plus a trade union; then to point to the new day as indicated by the National Health Conference and the development of certain newer forms of providing medical care—such as the struggling Group Health Assn., Inc. of Washington, D. C.

As Rorty says, medicine has outgrown its economics and its sociology. As organized today it bases itself upon the private practitioner, the old family doctor, shown by a recent survey in New York City to be a vanishing species—already almost as rare as the buffalo. It bases itself upon the social case history method and the economics of individualism rampant, both obsolete principles among progressive social scientists.

Naturally thousands of physicians belonging to the American Medical Association pay little attention to its activities and know next to nothing of the more sinister intrigues of the commercial drummer type of medical politicians who formulate its less savory policies. Naturally these politicians entrench themselves and fight by fair means or foul for their vested interests. This leads them to hold that few if any suffer lack of medical care today, right in the face of the fact that 40,000,000 citizens form parts of families with annual incomes of $800 or less.

Rorty is not indicting the medical profession, except insofar as the indifference to abuses and the lethargic conservatism of its members lead them to endorse or not to protest against the policies of the medical politicians. He indicts the medical politicians whose misguided shrewdness and stupid public relations policy has unfortunately brought the profession the something less than tender attention of the Department of Justice.

This crisis could so easily have been avoided had the American Medical Association proceeded with a modicum of sound intelligence. But if you wish an indictment of those who have engineered this misfortune for organized medicine you had far better read the reply of the Department of Justice to the demurrer of the American Medical Association to its original indictment. There you will find stark facts both more dramatically and more interestingly marshalled than Rorty has them.

But Rorty is not to be blamed. He tackled a hard job. He had a publisher to reckon with. He got a vast lot of material and obviously lost his way in it at times. The book is rich in documentation. It is authoritative in its way. It makes fair reading. The author is by no means either biased or demented. This is no silly, insane attack on a fictioned medical Mussolini. It is a serious study and will well repay reading by members of the medical profession as well as by social scientists and laymen.

What Lies Ahead? Rorty attempts the answer in his final chapter: A more rapid development of medical cooperatives like those at Elk City, Okla., and in Washington, D. C.; enlargement of group hospitalization plans; many additional regular payment plans to embrace many more people; the re-professionalizing of pharmacy with a lowering of the costs of drugs and medical devices and appliances; voluntary hospitalization and health insurance plans, and a compulsory health insurance plan for the employed workers in lower-income brackets—with such State subsidy as seems necessary; full medical care for the indigent out of taxation. Meanwhile—in voting to condemn the moderate Wagner health bill the organized medical politicians still pursue their Bourbon policy.

T. Swann Harding.